Focus

A Continent in Chaos: Africa's Environmental Issues

While frequent civil wars and the deadly toll of HIV/AIDS in Africa continue to capture global headlines, tribal fighting and the killer virus are not the continent's only lethal threats. Until its deadly 1994 conflict, Rwanda was the most densely populated country in Africa and had the highest fertility rate. While the war has claimed millions of lives, the chaos also destroyed the infrastructure that once provided food, housing, and public services to the population. Among other calamities, many refugees have died from cholera due to poor water and improper food preparation in the camps. In the 1980s, agrarian communities in Ethiopia were nearly destroyed when all the farmers went off to fight its civil war; today, the country still depends on foreign food imports for its survival. With a total population of about 450 million, half of Africa's residents have no access to health services and two-thirds lack safe drinking water, according to a 1991 report by the World Bank. Most Africans are also gravely affected by poverty, civil war, indoor and outdoor pollutants, microbes that cause life-threatening diarrhea, tropical diseases such as malaria, rapid population growth, inadequate sanitation and sewage treatment, poor environmental management, corrupt government policies, desertification and deforestation, mining, and the overuse of pesticides and insecticides. Environmentally related diseases also compromise the continent's productivity, which in turn makes it more difficult to generate revenue to combat the environmental health problems.

"An environmental agency in sub-Saharan Africa is most likely to try and focus on malaria," says Dennis Carroll, project manager for the worldwide Environmental Health Project at the United States Agency for International Development (USAID). "That leaves them very little resources for potable water and sanitation programs. And now with urbanization a major trend, and with little regulatory infrastructure for by-products, these will become major problems in the future."

Industrial pollutants are still relatively rare, since close to 80% of sub-Saharan Africa remains pastoral or agro-pastoral. (North Africa is most often considered a part of the Middle East so is not included.) But because urban populations are growing quickly, and most heavy industries are located in or around major cities, increasing numbers of sub-Saharan Africans are now exposed to hazardous and toxic wastes. Developed countries are also shipping their most dangerous wastes to the continent because their own stringent environmental laws and high costs of disposal can make it difficult and expensive to dispose of them at home. But "disposal abroad is rarely accompanied by concern about the health of those involved or living near disposal sites," according to a 1992 report by the World Health Organization Commission on Health and Environment.

With high fertility rates throughout the continent, burgeoning populations will increasingly pressure a skimpy civil infrastructure. Sub-Saharan Africa's population is growing at about 3% each year, the fastest growth rate of any region worldwide. So are its cities. In 1990 and 1991, 20% of the population lived in urban and surrounding areas. Without aggressive attempts to control population growth and emigration from rural areas, experts predict that number could jump to 50% by 2010. And few anticipate that governments or communities will be able to cope with the increase.

Although fertility rates are high, life expectancy in most African countries continues to stay significantly lower than in most other regions of the world. In continental sub-Saharan Africa, Sierra Leone has the lowest life expectancy, at 43 years, while South Africa has the highest, 62, according to a 1991/1992 report published by the United Nations Environment Programme (UNEP).

GREEN

Water school. Environmental organizations like GREEN are providing water-quality test kits and training to African students and teachers.

Lack of Good Data

Those who assess and manage environmental health problems must rely on the collection, analysis, and use of reliable information. But good data on the environment and health in Africa, especially solid baseline data, are difficult to find. For example, statistics on infant and child mortality are often incomplete and questionable. This lack of good information can make it hard to determine which conditions and diseases are the culprits.

"There is very little baseline data on environmental health in Africa," says Andy Arata, professor of international health at Tulane University and a deputy director with the Environmental Health Project sponsored by USAID. "Most government institutions are already so weak in Africa. Air pollution may be easy to measure, for example, but it's hard to determine its cause and effect on health without good studies."

Relying on rough estimates to confront the complex and multilayered environmental health problems of sub-Saharan Africa has led, in part, to well-intentioned but shortsighted policies developed by foreign agencies and followed blindly by African governments. The World Bank and the International Monetary Fund are often singled out for such criticism because their lending policies encouraged rapid economic development. Once they had borrowed huge amounts of money, poor African countries were then forced to rapidly exploit their natural resources to pay the loans back. For example, large-scale mining, hydroelectric, and industrial projects were often developed without consideration for the environment or health. In addition, governments have tended to focus on developing urban areas and

ignored the rural areas where the largest populations live and work.

"Along with this huge debt, these agencies said you must follow our prescriptions," says Jim Scharrit, professor of political science at the University of Colorado at Boulder. "So the governments greatly increased production, which in many cases was environmentally destructive. And the less democratic regimes, especially, didn't have to respond to public demands that they protect the environment."

Valentine O. James

Living in filth. Undisposed of solid waste in towns such as Lagos, Nigeria, gives rise to cholera, dysentery, malaria, and contaminated water.

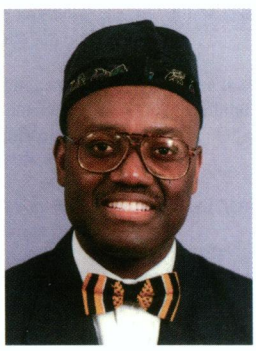
Saving the Children

Although infant and child mortality rates in many areas of sub-Saharan Africa have dropped in recent decades, they are still among the highest in the world. Acute respiratory infections, diarrheal diseases, and malaria top the list of causes of death for children under the age of five, especially infants. Antibiotic, rehydration, and chloroquine programs help save many African children from disease. But rural children are the most affected and least likely to receive life-saving medical attention and therefore account for most casualties.

Most of the estimated one to two million annual worldwide deaths from malaria occur in sub-Saharan Africa, according to a 1990 WHO report. Malaria thrives where stagnant pools of water provide breeding grounds for the Anopheles mosquito. Irrigation programs help create new breeding grounds and account in part for the spread of malaria into new areas, as in the cotton farms of the Sudan. Most everyone in savanna regions is infected by malaria early in life. If they can survive the initial attack, they acquire an ability to withstand mortality from the disease, although recurring bouts of the sickness sap physical energy and are blamed for low productivity throughout Africa. To combat the mosquitoes, many local governments still spray their areas with DDT or dip mosquito bed nets in insecticides.

"Although most countries have a Ministry of Health, it may not be big enough or adequate," says Arata. "And in the case of malaria, there's no way a Ministry of Health can handle it. So the Environmental Health Project will be looking at community groups to start considering preventative approaches and put health protection into their consideration. Plus, we'll be looking at irrigation areas, where you have more breeding sites that need to be closely monitored."

Diarrheal diseases are the most common cause of death during early infancy because babies lose precious water and electrolytes and die of dehydration. Mothers who were once urged to bottlefeed their children are now encouraged to breastfeed instead to avoid formula mixed with contaminated water, although breastfeeding also has its own potential adverse health effects. A serious public health problem in sub-Saharan countries, diarrheal diseases are most common where people live in crowded conditions, have poor food storage and sanitation, and little potable water.



U. of Virginia

Valentine Odoh James—Some countries have made genuine progress in improving water quality.

Water, Sewage, and Garbage

Many sub-Saharan water supplies are undrinkable, contaminated by bacteria, untreated or poorly treated sewage, heavy metals and silt from soil erosion, fertilizers and pesticides, mining tailings, and industrial waste. In the worst cases, only 12% of the population in the Central African Republic, 18% in the Ivory Coast, and 19% in Ethiopia have access to safe water, according to a 1992 United Nations report.

Because so many of Africa's health problems are closely linked to a supply of safe drinking water, providing clean water has become a priority for African governments and foreign donor agencies. But widespread social and economic problems hinder improvements and, again, data on water supply problems are limited. Some experts also blame the lack of significant progress on the lack of trained personnel to install and maintain treatment facilities, plus competing priorities such as food, shelter, and the development of infrastructure.

In Ghana's capital city, Accra, most residents have access to treated and piped water, but the systems often don't work. High connection charges also mean many homes do not have access to the city's central sewage system. In this case, they use pit, pan, or bucket latrines which they later empty into containers provided by the city council. The waste is then dumped at a station near the shore or into the city's open drainage system, according to the London-based International Institute for Environment and Development. Sixteen percent of Accra's households use flush toilets, but such modern plumbing is only found in middle- and upper-income homes.

Exacerbated by rapid population growth, poverty remains the primary cause for most of sub-Saharan Africa's environmental health problems. Africa's share of the world poor is estimated at 30% and is expected to rise to 40% by the year 2000, according to a 1994 report by the UNESCO Regional Office for Science and Technology in Africa. Intolerable environmental conditions, caused in great part by population explosions and poverty, have created 10 million "environmental refugees," writes the report's author, Livingstone Dangana, a program officer at UNESCO.

With low productivity and wages, town and country planning departments lack the financial means to improve services that would raise living standards. However, some neighborhood and grassroots organizations have begun to play a role in their own environmental management. For example, the Nima 441 Welfare Association in Accra managed to install public toilets in its slum neighborhood to cope with the lack of city-provided sanitation facilities.

But with the subcontinent's high fertility rate, any progress one year can be offset by increased population in the following years. For example, although the United Nations proclaimed the 1980s the International Drinking Water Supply and Sanitation Decade, about 20 million more Africans were without safe drinking water and 30 million were without adequate sanitation at the end of the decade than at the beginning, according to Valentine Odoh James, assistant professor of environmental planning at the University of Virginia and author of *Africa's Ecology, Sustaining the Biological and Environmental Diversity of a Continent.* But some countries have been setting targets for improving water quality and have made "genuine and sincere progress," says James, as in the town of Ikot-Ekpene, Nigeria.

"People there had been using the same water for cooking and for washing clothes," says James. "And there were a lot of cases of dysentery as a result. So the government had a water treatment plant built which now pipes treated water into 20% of the homes, since not everyone can afford to have piped-

in water. But those without water can get it from their neighbors, and the dysentery rate has dropped since the plant was built."

Freshwater reserves are also disappearing faster in sub-Saharan Africa than anywhere in the world, according to James. Though there are many water sources, including long and mighty rivers, they are not evenly distributed, and programs to harness them are often inefficient. Water is diverted for domestic and industrial needs, irrigation, hydroelectric power generation, transportation, fishing, recreation, and the disposal of waste products, among other uses. The water supply is also damaged by development programs designed to improve a region's economy or food production; for example, siltification is often caused by hydroprojects, and dams can provide a repository for toxic fertilizers. Few African countries have soil conservation strategies that would help prevent soil erosion and the siltification of water supplies, says James.

Valentine O. James

Food or water. Pesticides and fertilizers to increase crop yields end up polluting drinking water in many developing countries.

If water projects are not properly planned, they may create more problems than they solve, a situation USAID's Carroll calls "the impact of your success." A USAID project in the Senegal River Basin that harnessed some of the waters for agricultural and energy purposes has now changed settlement patterns in the region. Today there are "clusters of people that weren't there before, with a lot of sitting water that can create potential new breeding sites for disease. The issue there is that where you solve one problem you create another," said Carroll. USAID is now studying the environmental health impacts of its long-standing water resource activities. "One part of our analysis is to address questions we should have in the first place," says Carroll. "You're only as wise as your hindsight permits you to be."

While water and sewage treatment is rare in most African cities, so is garbage collection. The poorer areas are the least likely to have any way to safely dispose of their household trash and garbage. In Kampala, Uganda, for example, less than 20% of the population benefits from regular collection of household wastes and less than

Sources and impacts of some pollutants

Pollutant	Source	Impact on human health and welfare
Sediment	Agricultural fields, pastures, and livestock feed lots; logged hillsides; degraded streambanks; road construction	Increased water treatment costs; transport of toxics and nutrients; reduced availability of fish, shellfish, and associated species; shortened lifespan of lakes, streams, and artificial reservoirs and harbors
Nutrients	Agricultural fields, pastures, and livestock feed lots; landscaped urban areas; raw and treated sewage discharges; industrial discharges	Increased water treatment costs; risk of reduced oxygen-carrying capacity in infant blood; possible generation of carcinogenic nitrosamines; reduced availability of fish, shellfish, and associated species; impairment of recreational uses
Organic materials	Agricultural fields and pastures; landscaped urban areas; combined sewers; logged areas; chemical manufacturing and other industrial processes	Increased costs of water treatment; reduced availability of fish, shellfish, and associated species
Disease-causing agents	Raw and partially treated sewage; animal wastes; dams that reduce water flow	Increased costs of water treatment; river blindness, elephantiasis, schistosomiasis, cholera, typhoid, dysentery; reduced availability and contamination of fish, shellfish, and associated species
Heavy metals	Atmospheric deposition; road runoff; industrial discharges; sludge and discharges from sewage treatment plants; creation of reservoirs; acidic mine effluents	Increased costs of water treatment; lead poisoning, itai-itai, and minamata diseases; kidney dysfunction; reduced availability and healthfulness of fish, shellfish, and associated species
Toxic chemicals	Urban and agricultural runoff; municipal and industrial discharges; leachate from landfills	Increased costs of water treatment; increased risk of rectal, bladder, and colon cancer; reduced availability and healthfulness of fish, shellfish, and associated species
Acids	Atmospheric deposition; mine effluents; degrading plant materials	Reduced availability of fish, shellfish, and associated species
Chlorides	Roads treated for removal of ice or snow; irrigation runoff; brine produced in oil extraction; mining	Reduced availability of drinking water supplies; reduced availability of fish, shellfish, and associated species
Elevated temperatures	Urban landscapes; unshaded streams; impounded waters; reduced discharges from dams; discharges from power plants and industrial facilities	Reduced availability of fish, shellfish, and associated species.

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20% of the solid wastes generated within the city are collected, according to the International Institute for Environment and Development. This means that organic wastes fill public spaces, backyards, lanes, pathways, and vacant lots, where they attract disease-carrying insects and pests and clog overflowing drainage channels.

Because of growing populations, residents in Accra, Ghana, generate about 800 tons of solid wastes per day, with an annual increase of 6%, according to a 1992 report by the Stockholm Environment Institute. Most of the waste is organic, including ashes from fuel wood and charcoal, as well as the remains of common foods such as sugar cane, mangoes, and bananas. With little equipment to manage the refuse, garbage is only collected in high-income areas. The rest is dumped in unauthorized dumping sites, primarily along waterways. Associated health problems include high incidences of cholera, diarrhea, and dysentery, especially in children who tend to play in such areas.

Agriculture, Mining, and Industry

Beginning in the 1800s, European colonization introduced large-scale plantations and cash-traded agriculture to a continent that had relied almost solely on subsistence agriculture for centuries. Many Africans embraced the new practices, including the use of technology, fertilizers, and pesticides, and abandoned traditional farming practices. But since the plantations focused on production for European markets, the shift left many local populations hungry. Despite independence for many African countries since the 1950s and 1960s, Africa is still highly dependent on the foreign markets that continue to drive its agricultural practices today.

Still practiced in most areas, traditional subsistence agriculture has led to a significant decline in the quality of sub-Saharan Africa's natural environment. Common farming meth-

Where are the healthy environments in Africa?

	Percentage of population with access to											Number of trained medical personnel (latest year)		
	Safe drinking water				Sanitation services				Health services (1985–88)					
	Urban		Rural		Urban		Rural						Nurses and	
Country	1980	1988	1980	1988	1980	1988	1980	1988	All	Urban	Rural	Doctors	midwives	Other
Algeria	x	x	x	x	x	x	x	x	88	100	80	9056	474	67,281
Angola	85	75	10	19	40	25	15	20	30	x	x	481	6,518	1,910
Benin	26	66	15	46	48	42	4	31	18	x	x	238	1,640	522
Botswana	x	70	x	x	x	98	x	20	89	100	85	x	x	x
Burkina Faso	27	44	31	72	38	35	5	5	49	51	48	131	2,899	9,813
Burundi	90	100	20	34	40	80	35	5	61	x	x	216	1,503	196
Cameroon	x	100	x	96	x	x	x	x	41	44	39	x	x	x
Cape Verde	x	87	21	65	34	35	10	x	x	x	x	60	196	x
Central African Republic	x	13	x	11	x	x	x	11	45	x	x	x	x	x
Chad	x	x	x	x	x	x	x	x	30	x	x	x	x	x
Comoros	x	x	x	x	x	x	x	x	x	x	x	31	168	7
Congo	36	92	3	2	17	x	0	2	83	97	70	210	2,746	406
Djibout	50	50	20	21	43	94	20	50	x	x	x	77	534	161
Egypt	88	96	64	82	45	100	10	34	x	x	x	9,495	12,458	x
Equatorial Guinea	47	x	x	x	99	x	x	x	x	x	x	x	x	x
Ethiopia	x	70	x	11	x	97	x	7	46	x	x	534	1,896	5,907
Gabon	x	90	x	50	x	x	x	x	90	x	x	328	x	3,366
Gambia	85	92	x	73	x	x	x	x	x	x	x	x	x	x
Ghana	72	93	33	39	47	64	17	15	60	92	45	817	x	x
Guinea	69	55	2	24	54	65	1	x	47	100	40	x	x	x
Guinea-Bissau	18	18	8	27	21	30	13	18	x	x	x	122	785	137
Ivory Coast	x	100	x	75	x	69	x	20	30	61	11	x	x	x
Kenya	85	x	15	x	89	x	19	x	x	x	x	2,151	17,193	4,581
Lesotho	37	59	11	45	13	14	14	23	80	x	x	x	x	x
Liberia	x	93	16	22	18	4	5	8	39	50	30	221	1,152	350
Libya	100	100	90	80	100	100	72	85	x	x	x	5,019	5,565	1,018
Madagascar	80	62	7	10	9	x	x	x	56	x	x	x	x	x
Malawi	77	66	37	49	100	x	81	x	80	x	x	262	1,286	351
Mali	37	100	0	36	79	94	0	5	15	x	x	349	5,223	308
Mauritania	80	67	85	65	5	34	x	x	30	x	x	142	1,230	200
Mauritius	100	100	98	92	100	92	90	96	100	100	100	x	x	x
Morocco	100	100	x	25	x	100	x	19	70	100	50	4,908	22,207	467
Mozambique	x	44	x	17	x	61	x	11	39	100	30	x	x	x
Namibia	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Niger	41	100	32	52	36	39	3	3	41	99	30	160	7,248	6,611
Nigeria	60	100	30	20	x	x	x	x	40	75	30	11,294	74,033	20,150
Rwanda	48	46	55	64	60	45	50	62	27	60	25	163	x	1,550
Senegal	33	79	25	38	5	87	2	x	40	x	x	311	1,393	2,110
Sierra Leone	50	83	2	22	31	59	6	35	x	x	x	262	2,830	478
Somalia	60	50	20	29	45	41	5	5	27	50	15	325	3,416	5
South Africa	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sudan	x	90	31	20	63	40	0	5	51	90	40	2,095	12,986	4,189
Swaziland	x	100	x	7	x	100	x	25	x	x	x	33	477	160
Tanzania	x	75	x	46	x	76	x	77	76	99	72	x	x	x
Togo	70	100	31	61	24	42	10	16	61	x	x	229	1,973	934
Tunisia	100	100	17	31	100	71	x	15	90	100	80	3,453	9,353	11,831
Uganda	45	45	8	12	40	40	10	10	61	90	57	x	x	x
Zaire	x	59	x	17	x	14	x	14	26	40	17	x	x	x
Zambia	65	76	32	43	100	77	48	34	75	100	50	880	5,655	2,773
Zimbabwe	x	95	x	80	x	95	x	22	71	100	62	x	x	3,238

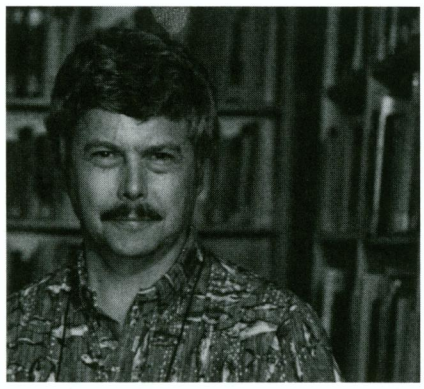
ods, such as slash-and-burn and shifting cultivation, have led to deforestation and desertification. While subsistence cultivation produces 70% of Africa's food, it has also cleared about 70% of the continent's closed-canopy forests and 60% of its savanna woodlands. Although it is one of sub-Saharan Africa's most prosperous nations, the cost of the Ivory Coast's relatively strong economy has been the highest rate of deforestation in the world, according to a 1992 World Resources Institute report. Farmers of coffee, cocoa, and other products are quickly clearing the tropical forests of the Ivory Coast to feed world markets and its own growing population.

The Nigerian government should increase the development of its vast agricultural and rural areas, where at least 70% of its population resides, according to a report by Dayo Ademisokun-Turton, lecturer at the Obafemi Awolowo University in Ile-Ife. Because of an acute shortage of food, writes Ademisokun-Turton, Nigeria should increase its agricultural production by providing small-scale or medium-scale farmers with modern tools. However, more farmlands mean fewer forests and more deserts.

In addition to expanding farmlands, the intense gathering of firewood is another major cause of deforestation. Few rural Africans have access to modern fuel sources, and forests and woodlands are disappearing quickly as growing communities seek wood to cook food and heat homes. Overgrazing by cattle and goats has also helped expand the desert. For example, nomadic pastoralists, who must often confine their herds now because of encroaching agriculture and restricted borders, are watching once fertile grasslands turn to desert.

The legacy of excessive cultivation and grazing, in part caused by overcrowded communities, is severely damaged topsoil, which reduces agricultural productivity. In the semi-desert Sahel region, droughts have also compromised agricultural productivity in recent years. When soil fertility drops, farmers turn to the heavy use of fertilizers and pesticides, which in turn contaminate the local drinking water.

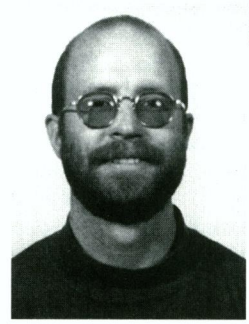
As part of a "green revolution," meant to increase agricultural production, many African farmers have greatly increased their use of chemically based pesticides, herbicides, and fungicides. The UNEP report cites research that suggests that more than 11 million acute pesticide poisonings, including those with only minor effects, occur annually in Africa, making them a major public health problem. In Sudan, for example, 384,000 agricultural workers, or 80% of the labor force, were poisoned by pesticides.



East-West Center

Kirk R. Smith—The problem of acute respiratory infections in children living in homes where coal and biomass fuels are used has often been overlooked.

Until recently, drinking water was often collected and stored in empty pesticide cans in Nigeria. Users of the water died from the poisons, according to James, until educational efforts convinced them the deaths were a result of contamination from the cans. In addition, pesticides have been stored in nylon sacks and kept in huts, according to Tim Donahue, program coordinator for the Global Rivers Environmental Education Network. "With heavy rains in lower-lying areas near river beds, the pesticides would leak out of these permeable sacks and contaminate the soil and water," says Donahue.



GREEN

Tim Donahue—We're trying to get kids to monitor their environment.

Pesticides and insecticides are often used in Ghana's tropical environment to control insect and pest populations, including the Anopheles mosquito and rats. But although traces of DDT and derivatives have been detected in mango leaves, overall levels of chlorinated hydrocarbons "appear to be low," according to the Stockholm Environment Institute. Ghana's Environmental Protection Council recently appointed a Toxic Chemicals Committee to advise it on controlling the use of toxic chemicals and is considering legislation to limit the use of pesticides and toxic chemicals.

In South Africa, one of the unanticipated effects of economic sanctions during its years of apartheid was the severe air pollution that primarily affects black residents. To avoid dependency on foreign oil imports, South Africa had developed an energy system that produced gasoline from coal, pushing the country close to the top in worldwide carbon emissions per capita.

"With the end of apartheid and the election of Nelson Mandela, air pollution is now a hot political item in South Africa," says John Young, senior researcher at the WorldWatch Institute in Washington, DC. "Traditionally there's been a sharp difference in environmental quality between white and black areas. The black townships, with their 20 million people, have been using dirty coal for years, and today they are some of the worst areas in the world. That situation is ripe for change."

In a typical scene, a young mother leans over an open cookfire in a small dwelling in a village in sub-Saharan Africa carrying an infant on her back while two toddlers play at her feet. The home has little ventilation and the kitchen air is thick with smoke. If it is winter and cool outside, the fire will burn all day to keep the home warm. Though her children cough, there is no place to escape the smoke.

In many African communities south of the Sahara Desert, up to 95% of households rely on coal and biomass fuels (wood, charcoal, crop residues, dung, and grass) for cooking, heating, and light. Smoke from these simple stoves contains respirable particulates, carbon monoxide, nitrogen oxides, formaldehyde, benzene, and other simple and complex organic compounds, including polyaromatic hydrocarbons, according to Kirk Smith, a senior fellow and coordinator of the program on Environmental Risk and Development at the East-West Center in Honolulu. Regularly exposed to such hazards, children in these households often develop acute respiratory infections (ARIs) and die of pneumonia.

"Generally, in the past, this problem has been overlooked," says Smith. "When we first started our research into ARIs in the early 1980s, we were told 'That's silly, people have been living with smoke for centuries.' But we now know that children with serious ARIs are much more likely to live in homes that use coal and biomass fuels, although there is a whole range of interactive risk factors, including poor nutrition and measles, that can help trigger pneumonia."

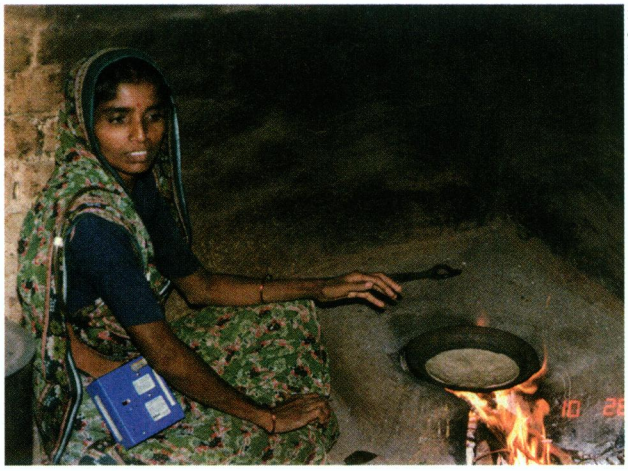
Because most automobiles still use leaded fuel, and because car inspections can be rare and inadequate, the air in major cities throughout sub-Saharan Africa contains high concentrations of lead. In addition, clusters of factories are often built in or near residential areas because of poor zoning laws, according to Nancy Chege, staff researcher at the WorldWatch Institute.

"The industries do just what they want," says Chege. "So they don't bother to make their effluent less toxic. Plus there isn't yet much public awareness, and environmental laws have a lot of loopholes."

The mining industry is also little regulated. Most of Africa's most valuable mineral deposits are found at the southern end of the continent. Copper and cobalt in Zaire, diamonds, gold, platinum, and chromium in South Africa, uranium in Namibia, and bauxite in Guinea. In contrast to heavily mined areas in the United States and Europe, Africa can still boast higher-grade deposits which, if mined efficiently, produce lower

amounts of waste. But in the case of copper mining, most of the yield is waste, which is then ground into powder and pumped into huge tailing ponds. The waste then makes its way into the local drinking water. In addition, such toxic by-products as arsenic, cadmium, lead, and sulfuric acid are contaminating water and soil.

"It's how you manage the mine," says Young. "Africans tend not to have much in environmental controls, and the Mining Ministry is both the promoter and the regulator for mining. And because worldwide mineral prices are low, many countries are increasing their production to compensate and meet their world debt. In this case, damage to the environment is a low priority."



Kirk Smith

Smoky fires. Use of coal and biomass fuels for cooking exposes women and children especially to a variety of air pollutants.

Few African countries have developed occupational health and safety standards to help protect the millions of mine and factory workers who are now trying to quickly adapt to industrial technologies. Although safety committees were set up in South Africa in 1983 through the Machinery and Occupational Safety Act, the country's trade unions have argued the committees have not adequately addressed their health and safety issues. Because South African workers are often illiterate, they unwittingly handle hazardous substances and are exposed to dangerous operating procedures.

"One of the biggest problems with worker health and safety issues is in the mining industry, especially coal mining," says Young. "They have had very high accident rates. So it will be interesting to see what happens with the mines when the owners are subjected to having to give a livable wage and improve conditions."

As a major oil producer in Africa for several decades, Nigeria has seen its environment degrade as a result of intense exploration by national and multinational petroleum companies. Oil spills have so polluted fishing areas along the Niger delta, according to James, that local residents have had to move to urban areas where they "become beggars." He continued, "It's one thing to meet the economic goals of foreign donors; it's another thing to pay attention to the environmental and social costs of a project."

Sustainable Development and the Future

Today, the buzzword in international aid to developing countries is "sustainable development," not just development that serves a short-term economic or political goal but a strategy that considers all the ramifications, including environmental, that could compromise a project's and a community's long-term viability. One recent component of sustainable development is environmental risk assessments, which may predict the impact of a proposed project, such as a hydroelectric plant or new mining operation. However, such assessments are still new in Africa and rarely conducted.

After the 1992 United Nations-sponsored Earth Summit, African governments and Western donors pledged more than $2 billion to a World Bank-managed Global Environmental Facility designed for environmental rehabilitation in Africa and elsewhere. But many donors consider African governments too weak to implement such projects effectively. There are also ongoing disagreements between African leaders and Western aid officials regarding the best way to cope with the myriad problems. African governments are often mismanaged and corrupt, according to an August 1994 article in the *Washington Post*, and many donors doubt that the billions of dollars "now earmarked for environmental projects in Africa will have much impact in the absence of basic political and economic change."

Effective and enforceable environmental policies are difficult to develop and implement in many sub-Saharan countries. Ghana's Environmental Protection Council (EPC) was established in 1974 as an institutional framework for the country's environmental management. But at the time, without a coherent national environmental policy, attempts to address Ghana's critical environmental problems had been "largely ad hoc and cosmetic," according to a report by Clement Dorm-Adzobu, director of the EPC.

"Environmental degradation in Third World countries . . . has been covertly encouraged by the economic policies and activities of industrialized countries," wrote Dorm-Adzobu. But today, "it is generally desirable to foster international cooperation between and among nations and agencies in the search for sanity in environmental management practices." In the late 1980s, with the help of the World Bank and USAID, Ghana developed a National Environmental Action Plan to deal with six key environmental areas, including water management and mining hazards.

Grass roots organizations are increasingly taking on the protection of the environment and health themselves. In Nairobi, Kenya, the 14-year-old African NGOs Environment Network (ANEN) now boasts 430 members from 45 African countries. ANEN works with the United Nations Programme of Action for Africa Recovery and Economic Development and publishes a bimonthly magazine called *EcoAfrica*.

In addition to a continent-wide organization such as ANEN, specific regions have developed organizations to meet their own environmental needs. For example, the Eastern Africa Environmental Network, also located in Nairobi, is studying toxic waste management, chemical residues in agricultural soils, and population growth.

Such groups are also closely involved in educating local populations about the link between environment and health. Christopher A. Nyakiti, founder of the Nairobi-based Teachers Environmental Association, writes that "teachers are the best channel through which to disseminate environmental information." As part of its educational efforts, the Michigan-based GREEN is working to provide tools and methods to test water-quality to African students and teachers.

"We're trying to get kids to monitor their environment," says Donahue. "We tell them to look at the water and ask, 'Does it look muddy, does it have a bad smell, is it cloudier after a heavy storm?' The students can then work with community groups to make improvements, such as changing how farmers plow a field in order to reduce the siltification of water supplies."

Educating the next generation seems essential to improving Africa's fragile environmental health. Many development policies implemented in the past were based on real or perceived economic needs at the time and paid no heed to the environmental consequences. But today, Western aid agencies, as well as African governments and their citizens, realize that many such policies have weakened the viability of communities and their residents to such an extent that, ironically, the projects are doomed to fail. However, many lessons have been learned and Africa can begin to repair its damaged environment today and preserve it for future generations.

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